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Genetic diversity and identification of symbiotic community of Q *Bemisia tabaci* from Mediterranean countries

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Introduction: We investigated a) the genetic diversity and population structure, b) the secondary symbiotic bacterial community and c) the frequencies of target site mutations conferring resistance to pyrethroids and organophospates in Q *Bemisia tabaci* collected from 5 Mediterranean countries.

Material and Methods: Polymorphism at seven microsatellite loci and a 676-bp fragment of the cytochrome oxidase I (COI) gene were investigated for the genetic analysis of *B. tabaci* populations. Simple PCR based detection assays were used for the discrimination of *B. tabaci* subgroups and the detection of mutations associated with target site insecticide resistance (iAChE, kdr). Secondary symbionts were detected using specific primers. *Wolbachia* strains were characterized by Multilocus Sequence Typing (MLST) analysis.

Results: Analyses of the 676-bp COI fragment distinguished seventeen haplotypes which delineated two groups (Q1 and Q2), within the Q *B. tabaci*. Both Q1 and Q2 were found in Spain and France, whereas only Q1 was observed in Greece, Morocco and Tunisia. The analyses of the microsatellite loci polymorphism revealed a high level of genetic differentiation even between some neighbouring samples belonging to the same sub-group within a country.

In *B. tabaci* from Greece, Bayesian analysis revealed two main genetic groups within Q1, the first with populations from South Crete, and the second with populations from continental Greece and North Crete. Genetic differentiation was not correlated with host plant species or habitat. The secondary symbionts *Wolbachia* and *Hamiltonella* were present at high frequency while *Arsenophonus*, *Cardinium* and *Rickettsia* were absent. MLST analysis identified two *Wolbachia* strains which were found together in most of the Greek populations but never in the same host individual.

The frequency of pyrethroid resistance mutations L925I and T929V in the para sodium channel gene and the organophosphate resistant mutation F331W in the ace1 gene was determined. The higher frequencies of the resistance mutations were found in France, Spain, and Greece, where in some samples the resistant alleles were fixed. In Morocco and Tunisia, the resistant alleles were less frequent and in some localities even undetected.

Conclusion: Our findings suggest that the Mediterranean Q *B. tabaci* is more diverse and structured than reported so far and suggest that human activities play a major role in the genetic structure and as well as in the dynamics of resistance genes. The role of the symbionts, and in particular of *Wolbachia* W1 and W2 strains in the shaping of the population genetic structure, is currently under investigation.

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Key words: COI, Q *Bemisia tabaci*, insecticide resistance microsatellites, secondary symbionts

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